Claims 1, 2, 5-6, 8-13, 15, 19-21, and 34

The Office Action rejected claims 1, 2, 5-6, 8-13, 15, 19-21, and 34 under section 103 as being unpatentable over Gentile in view of Robinson. Applicants respectfully traverse these rejections, in the following arguments.

Gentile is directed to dividing a bitmap into regions of different types so that different compression algorithms can be applied to different portions of the image. The reference discloses separating a display page into regions, either according to the display type or in an arbitrary fashion (col. 5, lines 60-65). The regions are then characterized as one of several types, such as graphics, text, and images. Ideally, the characterization of each region is related to the compressibility of the types contained in the region. The regions are then further divided into bounding boxes enclosing an object or object portion in the region (col. 7, lines 35-36). Each bounding box is further distilled according to its contents, compressed, and then stored.

Robinson is directed to a technique to store texture maps. As disclosed in the background section, traditional methods for creating and storing texture maps store the transparency, color, and intensity value for each texture, possibly requiring extensive storage space for this information (col. 2, lines 10-12). Robinson defines a "spatial contour texture map" which is representative of the transparency, color, or intensity value for each texel. From the spatial contour texture map, the proper transparency, color, and intensity values for the contour map may later be computed. Illustrated in Figure 2, Robinson stores the distance of the texel from the boundary between two area types in lieu of the intensity, color, or transparency value as well as a positive or negative flag to represent whether the texel is inside or outside the boundary. One bit is needed to store the flag (col. 4, lines 24-41). Following this characterization, the contour texture map may be combined with a polygon and displayed (col. 5, lines 10-12).

The Office Action asserts that the first element of claim 1 is provided by Robinson and Gentile. Applicants respectfully disagree. In Robinson, the boundary 16 is defined as between a first region 12 and a second region 14: "the first region 12 has a first transparency, color or intensity value (v1) associated therewith and the second region 14 has a second contrasting transparency, color or intensity value (v2) associated therewith" (col. 3, lines 55-63). Thus, the boundary in Robinson is a boundary between one transparency value and another transparency value, one color value and another color value, or one intensity and another intensity value. By contrast, Applicants' claim 1

recites: "generating a bitmap representing boundary pixels in said image," but where the bitmap separates regions of *textures*. Robinson's "boundary" is not of regions of textures, but a representation of change in one of the chosen characteristics of color, transparency, or intensity of a texture map. Thus, the first element of claim 1 is not taught by Robinson. Similarly, Gentile does not suggest to divide regions of textures.

Applicants respectfully traverse the proposed combination of Robinson and Gentile as yielding Applicants' claimed subject matter. First, contrary to the assertion in the Office Action, Gentile does not show "generating a pointer for each of said regions, each of said pointers associating its respective region with one of said textures for the image in such region" (claim 1). According to the cited passage of Gentile, after an image is subdivided into regions, each region is assigned a display list of primitive elements where "these primitive elements are stored in the display list indirectly via pointers" (col. 7, lines 16-19). Further, these "primitives" include a variety of objects and bitmaps, but multiple primitives can reside in each region. Nowhere, however, is it suggested that a "region" be filled with a particular texture. So, Gentile's pointers associate a region with one or more primitive elements, while Applicants' pointers associate a region with a texture.

To the contrary, the point of creativity areas in Gentile is to allow different compression algorithms to operate on the different areas. This would be irrelevant in the context of Applicants' disclosure, where each region has a pointer to a particular texture. These observations lead to the second issue: neither the references nor other art suggest to combine Gentile and Robinson to yield the claimed subject matter. Robinson, as stated above, is directed to figuring out a new way to more efficiently store texture maps. In compressing and storing images, Gentile focuses on the different compressibility of different region types and discloses several compression techniques (col. 10, line 44 - col. 11, line 4). That is, Gentile divides and then applies different compression algorithms, while Applicants compress the boundary bitmap, but the boundaries are of texture regions. Because Gentile's concern is the compressibility of different types of data, it suggests not to focus on regions made up of particular textures. Thus, Applicants respectfully request reconsideration of the obviousness rejection of claim 1.

As for claim 2, neither of the cited references disclose "said boundaries comprise pixels of a first value, and said regions comprise pixels of values other than said first value" (claim 2). Thus, Applicants respectfully request reconsideration of the obviousness rejection of claim 2.

Claim 5 narrows claim 1 by specifying a location within a region (in addition to the texture) being designated by the pointer. Claim 6 further narrows claim 5 by designating only a single location to each pointer. These specific recitations are not disclosed by Gentile. Gentile merely describes primitive elements as "basic object portions" that combine to define an object of an image (col. 7, lines 11-13). Such disclosure does not suggest a texture, as Applicants claim. Further, Gentile merely suggests a preference that "a single display list is generated for each region" (col. 7, lines 19-20), which does not suggest the specific implementation of pointers recited in claims 5 and 6. Thus, Applicants respectfully request reconsideration of the obviousness rejections of claims 5 and 6.

A dependent of claim 1, claim 8 recites: "said boundaries comprise a first one of said textures." Claim 9, a dependent of claim 8, recites "generating said bitmap comprises converting each pixel in said image which is not of said first one of said textures to a second one of said textures." Applicants respectfully disagree that Gentile discloses the method of generating a bitmap, as recited in claim 9. Furthermore, the language "converting each pixel in said image which is not said first one of said textures to a second one of said textures" cannot be said to have been taught by Figure 2 of Gentile. Figure 2 of Gentile simply shows that portions of an image are separated into text 38, graphics 42, and images 46 (Figure 2). There is no teaching or suggestion of *converting* anything in Figure 2. Another dependent claim, claim 10, further extends claim 9 by reciting: "generating said pointers comprises finding a location in each of said regions which is not said second one of said textures.

None of these three claims is disclosed in any way in Robinson or Gentile, least of all in Figure 2 of Gentile. Gentile is not even concerned with converting textures to one color and then compressing them. Rather, Gentile is directed, as stated above, to dividing the regions into different types and compressing the different types accordingly. Robinson is directed to finding an alternative to storing the transparency, color and intensity value for each texture. As a substitute, Robinson uses a spatial contour texture map which uses a direction vector to represent the transparency, color and intensity values. Neither reference discloses the teachings recited in claims 8-10 of Applicants' claims (col. 1, lines 41-46). Thus, Applicants respectfully request reconsideration of the obviousness rejections of claims 8, 9, and 10.

Claims 11-13 were also rejected under section 103 as being unpatentable over Gentile in view of Robinson. Claim 11 further defines the bitmap of claim 1 as having one bit per pixel. Claim 12 depends from claim 11, and adds the step of encoding the bitmap. Claim 12, a dependent of claim 11, recites a particular method of encoding (or compressing) the bitmap. As all three claims ultimately depend from claim 1, the foregoing traversals apply to these claims as well. Thus, Applicants respectfully request reconsideration of the obviousness rejections of claims 11-13.

Next, claim 15, an apparatus claim, and dependent claims 19-21 were rejected as unpatentable over Gentile in view of Robinson. As claim 15 recites the same textures of claim 1, the foregoing arguments drawn to claim 1 also apply for claim 15. Likewise, claims 19-21 recite language similar to claims 11-13, and depend from claim 15. Thus, Applicants respectfully request reconsideration of the obviousness rejection of claims 15 and 19-21.

Finally, claim 34 was rejected under section 103 as being unpatentable over the same references, Gentile and Robinson. As claim 34 recites language similar to claim 1, of which the foregoing arguments are directed, Applicants likewise traverse this rejection and respectfully request that such rejection be reconsidered.

Claims 3, 4, 14, 16-17, 22-27, and 31-33

Next, the Office Action rejected claims 3, 4, 14, 16-17, 22-27, and 31-33 under section 103 as being unpatentable over Gentile in view of Robinson, and further in view of Sakuragi or Baisuck. For the following reasons, Applicants respectfully traverse these rejections.

Sakuragi et al. is directed to providing an apparatus that justifies characters of different sizes that are arranged on the same line (col. 1, lines 41-46). The Office Action asserts that Sakuragi et al. teaches "assigning codes to said textures" (claim 3). The cited passage discloses a text memory 41 which "sequentially stores code data corresponding to character input from the keyboard 6 as text data" (col. 4, lines 8-10). This passage does not teach "assigning codes to textures"; rather, it teaches assigning codes to characters input from the keyboard. Nor is there a suggestion in Sakuragi to extend this teaching to other entities, least of all to textures.

Baisuck et al. is directed to reducing the size of geometric databases which are used in the analysis of integrated circuit layouts (abstract). The premise is that the integrated circuit layout is represented by geometric shapes, known as cells, which represent a given

area of the final integrated circuit design. Each cell is comprised of references to shapes and other lower level cells (col. 3, lines 47-51). These cell representations enable rules to be imposed upon these shapes, thus providing an analysis of the original integrated circuit design (col. 6, lines 36-55). By storing results of rule analysis on the cells or geometric shapes, a savings in database storage space can be achieved (col. 6, lines 56-64). The Office Action suggests that the cell representation features of Baisuck can be used in Gentile, rendering claim 3 obvious. However, no motivation to combine can be found from either reference. Baisuck, at least, is non-analogous art, as is Sakuragi. Thus, Applicants respectfully request reconsideration of the rejection of claims 3 and 4. Further, claim 3 is dependent from claim 1, which is not obvious in view of any of these references. As dependent from claim 3, the foregoing arguments are relevant to claim 4 as well.

Claim 14 is an independent method claim directed to compressing a digital image represented in the particular manner disclosed in Applicants' specification. The step "generating a bitmap" recites, as with claim 1 and other independent claims, a particular bitmap representation: "a bitmap . . . representing boundary pixels of a first one of said textures separating said regions in said image." Such a representation is not disclosed by the prior art, as discussed above. Furthermore, the same step recites: "by converting each pixel in said image not of said first one of said textures to a second one of said textures." So, the "generating a bitmap" step is achieved "by converting" in the particular manner recited in claim 14. Such manner is not disclosed, suggested or taught. Thus, Applicants respectfully request reconsideration of the rejection to claim 14.

The Office Action asserts that Sakuragi provides for a pallete, as recited in claim 16, by using a CGROM (Office Action, p. 4). According to Sakuragi, "the CGROM 33 stores data indicating the widths corresponding to the various sizes of respective characters input from the keyboard 6, and the dot pattern data corresponding to the respective characters." Thus, the data in the CGROM 33 associates each character with its width, perhaps in a table. In Applicants' claim 16, the data structure recited in claim 15 additionally includes a palette which associates a texture with a code. In Applicants' disclosure, the code is an arbitrary assignment (Figure 3). In contrast, the Saguraki width associated with each character is non-arbitrary. For at least this reason, Applicants' claim 15 is not obvious over Sakuragi. Further, the "things" to which associations are made are different and non-analogous. A prior art association of a thing to a value cannot render all subsequent associations obvious. Thus, Applicants respectfully request reconsideration of the rejection of claim 16.

Claim 17 narrows the scope of claim 15 by specifying that the pointers that associate each region of the digital image further include a location and a texture code. As argued above, the presence of pointers in the prior art does not render every particular use of pointers obvious. None of the four references cited in the rejection to claim 17 discloses a pointer which associates a region to a texture by providing a location in the region and a texture code. Thus, Applicants respectfully request reconsideration of the claim 17 rejection.

Claim 22 is an independent method claim directed to the decompression of a compressed digital image. As with prior independent claims, claim 22 provides for a specific type of bitmap which is not disclosed by the referenced art. The fact that Gentile refers to "decompression" and "filling" does not render this method claim obvious. Further, as stated before, Applicants specifically disagree that Robinson provides "a bitmap representing only boundaries" (Office Action, p. 4). As claims 23-27 depend from claim 22, Applicants respectfully request reconsideration of the obviousness rejections of claims 22-27.

Claims 31 and 33 are independent method claims. Again, both claims recite a specific type of bitmap, neither disclosed nor taught by the references. As for the overlay step being admitted prior art (Office Action, p. 5), it is but one step of a novel sequence of steps. Thus, the two claims are nonobvious. As claim 32 is dependent from claim 31, Applicants respectfully request reconsideration of the obviousness rejections to claims 31-33.

Claims 28-30

Next, claim 28 was rejected under section 103(a) as being unpatentable over Gentile in view of Robinson, Sakuragi, or Baisuck, and further in view of Murata. Claims 29-30 were rejected as being unpatentable over those same references, and further in view of Foley et al. "Computer Graphics: Principles and Practice." For the following reasons, Applicants respectfully traverse these rejections.

Murata is directed to an image synthesizing system for low-cost units which provides realistic far and near sense (Figure 11). Further, the disclosed system can perform calculations in real time (col. 4, lines 44-46). In prior art image synthesizers, the polygon generator 570 paints all the dots on a single polygon the same color (Figure 38). This produces a crude 3-D image. In order to create more realism in the 3-D image, the image may be further divided into more and more smaller and smaller polygons. The

multiplication of polygons quickly increases the cost and storage requirements of this system for displaying the image. As a result, lower quality 3-D imagery is the norm for low-cost systems such as video games.

Instead of dividing the polygon into smaller and smaller polygons, another prior art solution is to replace a color mapping of the polygon with a texture map (Figures 39 and 40). The mapping of a two-dimensional texture map upon a three-dimensional image, however, results in visual inaccuracies. Ultimately, this damages the far and near sense of the image as well as its linearity (Figures 3A-3C).

So, Murata presents an alternative to these prior art solutions by performing perspective transformation, not just to the X and Y coordinates of the image, but also to the Z coordinate, the TX, and the TY coordinates (the texture coordinates), to provide a linear relationship between all five coordinates (col. 10, lines 28-45 and col. 20, lines 35-38). In this way, Murata's image synthesizing system provides realistic far and near sense and maintains linearity between the XYZ coordinates and the texture coordinates (Figure 1).

Claim 28 is dependent from method claim 27, which is dependent from claim 22. Claim 22 describes the steps for decompressing Applicants' disclosed very particular bitmap. Claim 22 recites three steps: (1) providing the particular bitmap; (2) referencing a pointer which associates each region to a texture; and (3) filling each region with the correct texture. Claim 27 narrows the third step as having two parts: (1) referencing a pointer to determine a location, and (2) converting a region containing the location into the texture. Then, claim 28 adds two more steps to the filling step, further narrowing the claim: (1) determining a function, and (2) converting the pixels in the region according to the function. (Claim 28 recites those textures which are defined by a mathematical function, in contrast to those defined by a miniature bitmap, as shown in Figure 3.)

First, Applicants disagree that the cited portions of Gentile, describing Figure 2, obviously provide for "converting to color as a function of texture" (Office Action, p. 6). This is not even what Applicants' claim 28 recites. More properly stated, claim 28 provides for converting a region by filling it with a texture, where that texture is defined (and represented in the palette) as a function, rather than as a bitmap. Gentile does not disclose this.

Nor does Murata disclose or suggest such an implementation recited in claim 28. Yes, Murata discusses texture maps, but the disclosure relates to 3D images and the inadequacies of brute-force mapping of a 2D texture map to a 3D surface. Yes, Murata

discloses functions, but these functions are used to perform perspective transformation on the Z and texture coordinates of a 3D image to resolve the far and near sense visual problems created by the prior art. The piecemeal selection of elements from the prior art are both incomplete with respect to the more detailed elements of claim 28 and ignore the teaching of the reference as a whole. The presence of texture maps and functions in Murata does not alone render Applicants' claim 28 obvious. Thus, Applicants respectfully request that the rejection to this claim be reconsidered. As claims 29 and 30 depend from claim 28, Applicants additionally request that their rejections also be reconsidered.

Conclusion

For the foregoing reasons, Applicants submit that all claims as amended are in condition for allowance. For any questions or comments, the Examiner is encouraged to contact David R. Clonts at 713-220-5800.

Respectfully submitted,

George W. Jordan III

George W. Jordan III
Registration No. 41,880

AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.
711 Louisiana, Suite 1900
Houston, TX 77002
(713) 220-5800
(713) 236-0822 Fax

CERTIFICATE OF MAILING

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George W. Jordan III

George W. Jordan III
Registration No. 41,880